NTSB National Transportation Safety Board

Collaboration For Improved Safety and Productivity: Aviation Industry Success Story

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The Contrast

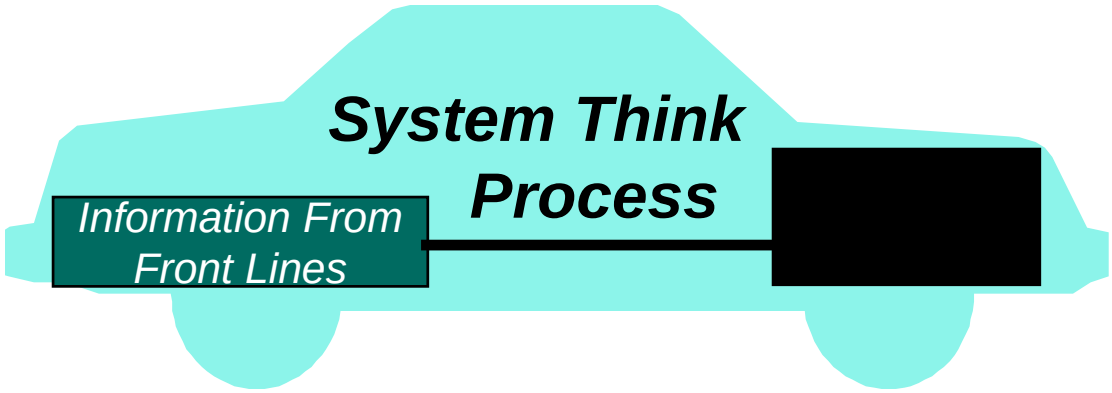
- Conventional wisdom:

Improvements that reduce risk usually *also reduce productivity*

- Lesson learned from proactive aviation safety programs:

Risk can be reduced in a way that also results in *immediate productivity improvements*

Process Plus Fuel Creates a Win-Win



Improved *Safety*

and

Improved *Productivity*

Outline

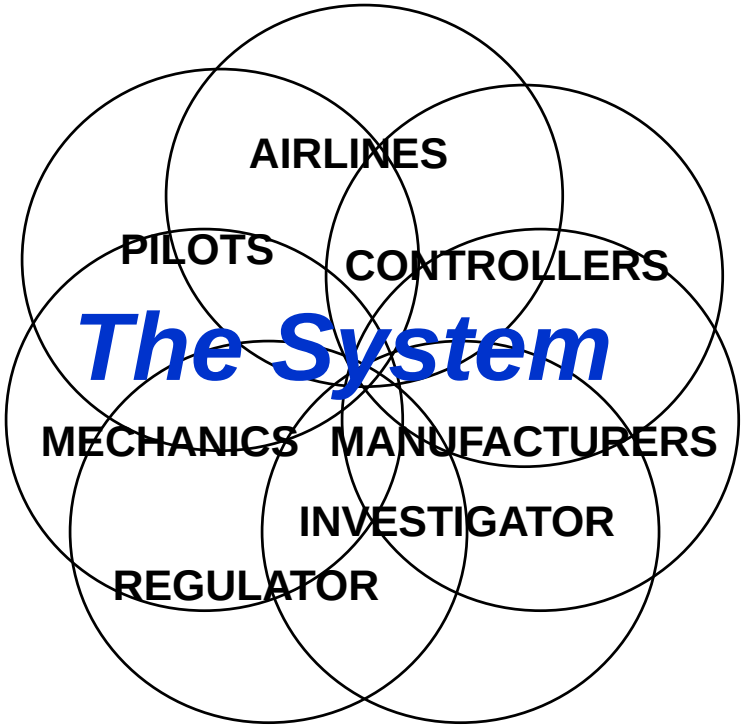
- The Context
- Importance of “System Think”
- Importance of Better Information
- Improved Safety *and* Productivity
- Roles of Leadership and Regulator
- Success Story is Transferable

NTSB 101

- **Independent federal agency, investigate transportation mishaps, all modes**
- **Determine probable cause(s) and make recommendations to prevent recurrences**
- **Primary product: Safety recommendations**
  - **Favorable response > 80%**
- ***SINGLE FOCUS IS SAFETY***
- **Independence**
  - **Political: Findings and recommendations based upon evidence rather than politics**
  - **Functional: No "dog in the fight"**

The Context: Increasing Complexity

- **More system *interdependencies***
  - Large, complex, interactive system
  - Often tightly coupled
  - Hi-tech components
  - Continuous innovation
  - Ongoing evolution
- **Safety issues are more likely to involve *interactions between parts of the system***



Effects of Increasing Complexity:

More **"human error" because**

- **System more likely to be error prone**
- **Operators more likely to encounter unanticipated situations**
- **Operators more likely to encounter situations in which "By the Book" may not be optimal ("workarounds")**

The Result:

Front-line staff who are

- Highly trained

- Competent

- Experienced,

-Trying to do the right thing, and

- Proud of doing it well

. . . yet they still commit

Inadvertent human errors

The Solution: System Think

Understanding how a change in one subsystem of a complex system may affect other subsystems within that system

“System Think” via Collaboration

Bringing all parts of a complex system together to collaboratively

- **Identify potential issues**
- ***PRIORITIZE* the issues**
- **Develop solutions for the prioritized issues**
- **Evaluate whether the solutions are**
  - **Accomplishing the desired result, and**
  - **Not creating unintended consequences**

When Things Go Wrong

How It Is Now . . .

You are highly trained

and

If you did as trained, you would not make mistakes

so

You weren't careful enough

so

You should be PUNISHED!

How It Should Be . . .

You are human

and

Humans make mistakes

so

Let's *also* explore why the system allowed, or failed to accommodate, your mistake

and

Let's IMPROVE THE SYSTEM!

Fix the Person or the System?

Is the person *clumsy?*

Or is the problem . . .

The *step???*

Enhance Understanding of Person/System Interactions By:

- Collecting,

- Analyzing, and

- Sharing

Information

Objectives:

Make the System

(a) Less error prone

and

(b) More error tolerant

The Health Care Industry

To Err Is Human:

Building a Safer Health System

"The focus must shift from blaming individuals for past errors to a focus on preventing future errors by designing safety into the system."

Institute of Medicine, Committee on Quality of Health Care in America, 1999

Major Source of Information: Hands-On "Front-Line" Employees

"We knew about that problem"

(and we knew it might hurt someone sooner or later)

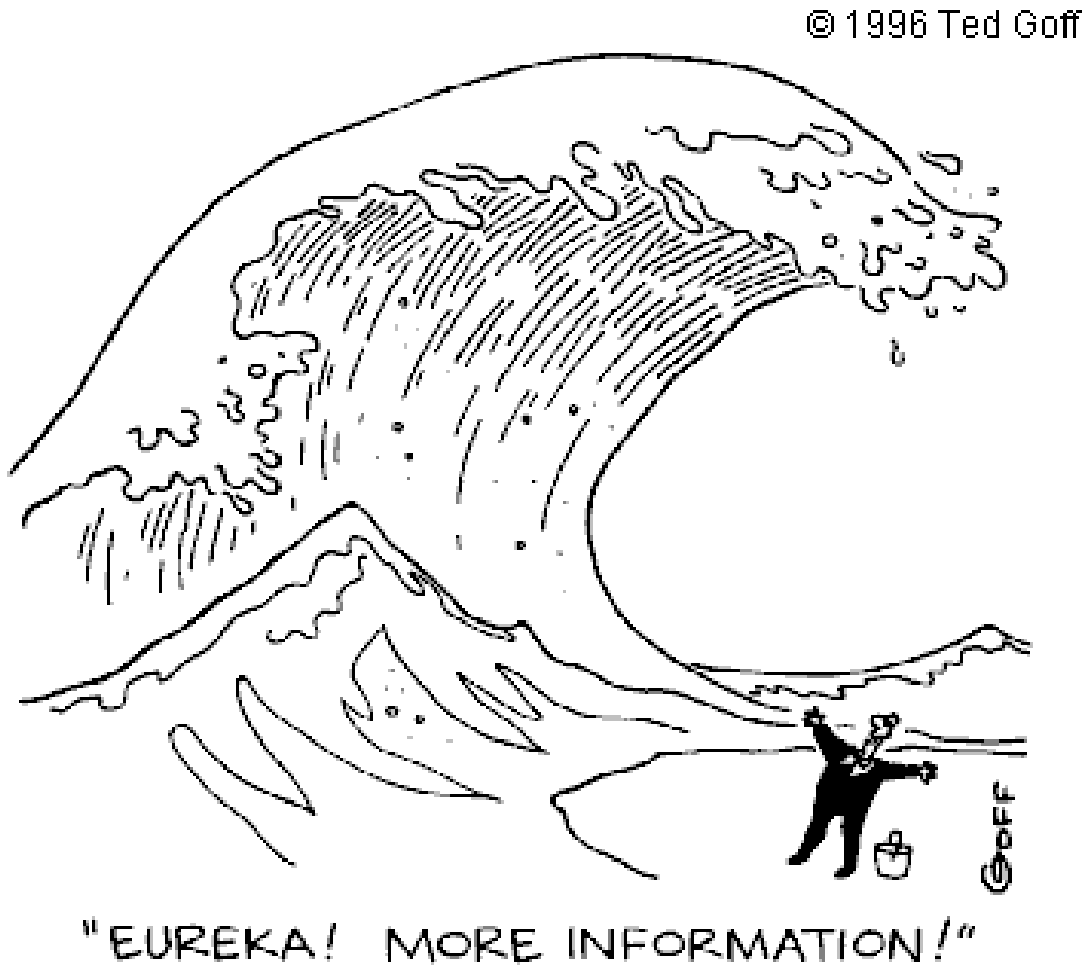
Next Challenge

Legal/Cultural Issues

Improved Analytical Tools

As we begin to get over the first hurdle, we must start working on the next one . . .

Information Overload



From Data to Information

Tools and processes to convert large quantities of data into useful information

Data Sources

Info from front line staff and other sources

DATA

Analysts

Tools

Processes

USEFUL

INFORMATION

Smart Decisions

- **Identify issues**
- ***PRIORITIZE!!!***
- **Develop solutions**
- **Evaluate interventions**

Aviation Success Story

83% decrease **in fatal accident rate, 1998 - 2007**

largely because of

System Think

fueled by

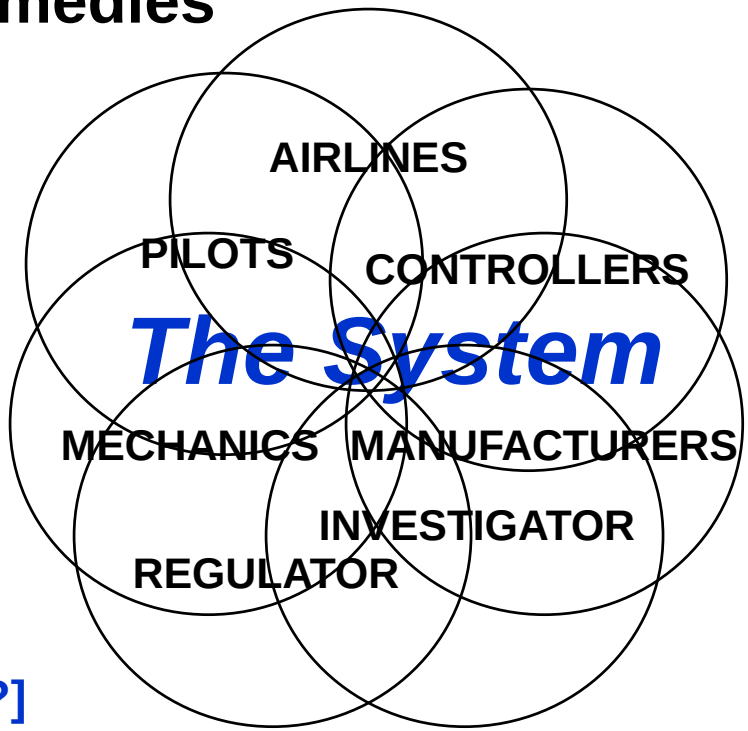
proactive safety information programs

P.S. Aviation was already considered *VERY SAFE* in 1997!!

Aviation "System Think" Success

Engage *all* participants in identifying problems and developing and evaluating remedies

- **Airlines**
- **Manufacturers**
  - ***With the systemwide effort***
  - ***With their own end users***
- **Air Traffic Organizations**
- **Labor**
  - ***Pilots***
  - ***Mechanics***
  - ***Air traffic controllers***
- **Regulator(s) [Query: Investigator(s)?]**



Moral of the Story

Anyone who is

involved in the *problem*

should be

involved in the *solution*

Major Paradigm Shift

- **Old: The regulator identifies a problem, develops solutions**
  - **Industry skeptical of regulator's understanding of the problem**
  - **Industry fights regulator's solution and/or implements it begrudgingly**

- **New: Collaborative "System Think"**
  - **Industry involved in identifying problem**
  - **Industry "buy-in" re interventions because everyone had input, everyone's interests considered**
  - **Prompt and willing implementation**
  - **Interventions evaluated . . . *and tweaked as needed***
  - **Solutions probably more effective and efficient**
  - **Unintended consequences much less likely**

Challenges of Collaboration

- **Human nature: "I'm doing great . . . *the problem is everyone else"***
- **Participants may have competing interests, e.g.,**
  - **Labor/management issues**
  - **May be potential co-defendants**
- **Regulator probably not welcome**
- **Not a democracy**
  - **Regulator must regulate**
- **Requires all to be willing, *in their enlightened self-interest,* to leave their "comfort zone" and think of the System**

Characteristics Enabling Collaboration

- **Intense media and political interest due to widespread fear of flying**
- **Anyone's accident is everyone's accident**
  - **Public does not care which airline**
- **Everyone wants to know why airplanes crash**
- **Airlines do not compete on safety**
  - **Willing to share safety lessons learned**

Queries

- **Is this industry-wide safety success story transferable from aviation to other industries?**
- **Is this process safety success story transferable to workplace safety?**

Applicability of Collaborative Approach:

- **Entire industry**
- **Company (Some or All)**
- **Type of activity**
- **Facility**
- **Team**

Manufacturer "System Think" Success

Aircraft manufacturers are increasingly seeking input, throughout the design process, from

- ***Pilots*** **(*User* friendly)**
- ***Mechanics*** **(*Maintenance* friendly)**
- ***Air Traffic Services*** **(*System* friendly)**

Workplace Safety Beta Test

- **Select troublesome area**
  - **Nagging problem for many years**
  - **Many interventions have been tried, not successful**
  - **Likelihood that problems are systemic, not just people**
  - **Collaboration as effort to address the system problems**
  - **Less defensiveness because not focused on single event**
- **Select collaborative corrective action group**
  - **All who have a hand in the process**
  - **Manufacturers?**
  - **Operators?**
  - **Regulators?**
  - **Others?**

Note HRO Characteristics*

- Preoccupation with failure
- Reluctance to simplify interpretations
- Sensitivity to operations
- Commitment to resilience
- Deference to expertise

*Source: Weick and Sutcliffe

But Then . . .

Why are we

so jaded in the belief that

improving safety

will probably

hurt the bottom line??

Costly Result$
Of Safety Improvements Poorly Done

Safety *Poorly* Done	Safety *Well* Done
1. Punish/re-train operator	Look beyond operator, also consider system issues

- *Poor workforce morale*
- *Poor labor-management relations*
- *Labor reluctant to tell management what's wrong*
- *Retraining/learning curve of new employee if "perpetrator" moved/fired*
- *Adverse impacts of equipment design ignored, problem may recur because manufacturers are not involved in improvement process*
- *Adverse impacts of procedures ignored, problem may recur because procedure originators (management and/or regulator) are not involved in improvement process*

Costly Result$
Of Safety Poorly Done (con't)

Safety *Poorly* Done	Safety *Well* Done
2. Management decides remedies unilaterally	**Apply "System Think," *with workers*, to identify and solve problems**
- Problem may not be fixed	
- Remedy may not be most effective, may generate other problems	
- Remedy may not be most cost effective, may reduce productivity	
- Reluctance to develop/implement remedies due to past remedy failures	
- Remedies less likely to address multiple problems	
3. Remedies based upon instinct, gut feeling	**Remedies based upon evidence (including info from front-line workers)**
- Same costly results as No. 2, above	

Costly Result$
Of Safety Poorly Done (con't)

Safety *Poorly* Done	Safety *Well* Done
4. Implementation is last step	Evaluation after implementation

- *No measure of how well remedy worked (until next mishap)*
- *No measure of unintended consequences (until something else goes wrong)*

Conclusion: Is Safety Good Business?

- *Safety implemented poorly can be very costly (and ineffective)*
- *Safety implemented well, in addition to improving safety more effectively, can also create benefits greater than the costs*

The Role of Leadership

- Demonstrate safety commitment . . .

but acknowledge that mistakes will happen

- Include "Us" (*e.g.*, System) issues,

Not just "You" (*e.g.*, training) issues

- Make safety a middle management metric

- Engage labor early

- Include the *System* --

manufacturers, operators, regulator(s), and others

- Encourage and facilitate reporting

- Provide *feedback*

- Provide adequate *resources*

- *Follow through* with action

How The Regulator Can Help

- **Emphasize the importance of System issues *in addition to* *(not instead of)* worker issues**

- **Encourage and participate in industry-wide "System Think"**

- **Facilitate collection and analysis of information**
  - **Clarify and announce *policies for protecting information and those who provide it***
  - **Encourage other industry participants to do the same**

- **Recognize that *compliance* is very important, but the *mission is reducing systemic risk***

Conclusions

- ***Safety issues in complex systems usually involve human/system interface issues***
- ***Collaboration can help address not only the human performance issues but also the system issues***
- ***Collaboration can also help ensure that safety improvement programs also improve productivity, which makes the safety improvements more sustainable***
- ***Aviation industry collaboration success is transferable to other industries and to workplace safety***

Thank You!!!

Questions?